phism, sexual selection, local variation, and the like? Admitting gratefully the good work of this kind which has been carried on in Europe, and especially in our own country, one cannot but regret that from tropical regions, where alone the abundance, complexity and incessant activity of life afford full prospect of the adequate reward of such research, we have little more than isolated notes and unconnected and incomplete observations, mere indications—precious as they are—of the rich harvest that lies unreaped for lack of resident workers devoted to the task.

It is on this account that I earnestly renew the plea, put forward from this chair on the 5th of May last, for the establishment, in tropical countries, of Biological Stations for the study of the terrestrial fauna; where, as in the existing Marine Biological Stations, naturalists could follow, during a succession of seasons, special lines of observation and experiment under favorable conditions of laboratory and other equipment, free from the hindrances and distractions of ordinary collecting travel, and with all the advantages of mutual help and encouragement. The living expenses, for men of the simple tastes of the naturalist, would not be great; and I feel certain that, with the increasing facilities for swift transport, it would not be long before many students of biology would embrace the opportunity so provided for the effectual prosecution of researches of the utmost value to science.

WILLIAM A. ROGERS.

PROFESSOR WILLIAM A. ROGERS was born at Waterford, Connecticut, November 13, 1832, and died at Waterville, Maine, March 1, 1898. His boyhood was spent for the most part in the interior of New York State, in the villages of DeRuyter and Alfred, where he received his preparation for college. In 1853 he entered Brown University, from which he was graduated in 1857. Before graduation he had already begun his career as a teacher in a classical academy, and immediately after taking his first degree he was appointed tutor in the academy at Alfred, N. Y., from which he had gone forth a few years previously as an exceptionally successful student. In 1859 he was advanced to the professorship of mathematics and astronomy in Alfred University, an institution under the care of the Baptist denomination, of which Professor Rogers was an ardent member throughout his life. This position he held eleven years, though absent part of this time for several specific purposes. Among these absences one was devoted to a year of study in the Harvard College observatory; six months were occupied in work as an assistant in the same place; fourteen months were given to service in the navy during the Civil War; and nearly a year was given to the study of mechanics in the Sheffield Scientific School at New Haven.

In 1870 Professor Rogers severed his connection with Alfred University for the purpose of becoming an assistant in the astronomical observatory at Harvard, and in 1875 he was here made assistant professor of astronomy. This position he retained until 1886, when he accepted the chair of physics and astronomy at Colby University, Waterville, Maine. Here the last dozen years of his life were spent; but had he lived a month longer he would have resumed his connection with Alfred University, where a new physical laboratory is now in process of erection. The building was planned by him in 1897, and on the occasion of the laying of the cornerstone, June 23, 1897, Professor Rogers delivered the dedicatory address. His resignation had already been offered to the Trustees of Colby University, to take effect April 1, 1898.

During the sixty-five years of his busy

life the most distinguishing characteristics of Professor Rogers, as a student and teacher of science, were his indomitable perseverance, industry, care, patience and accuracy. Beginning as a teacher of pure mathematics, he passed naturally into specialization in astronomy and its allied neighbors, mechanics and physics. His delight was minute measurement, with accuracy to the last decimal place that patient industry could render attainable. He sought accuracy not merely for the securing of the best practical results, but because he had a veritable passion for its pursuit. The first time that the present writer came into contact with him was at the Boston meeting of the Scientific Association in 1880, when he gave the outcome of an elaborate comparison between the standard French meter and the imperial yard, the uncertainty being in the value of the digit occupying the place of ten-thousandths of an inch. Another result almost identical with the first was reported in 1882 at Montreal as the outcome of new measurements, the meter being equivalent to 39.37015 inches under standard conditions. Still another was given a year later at Minneapolis, 39.37027 inches. At Philadelphia, in 1884, he announced a re-examination of his data, with the expression of his conviction that this result was a little too high, but that the true value could not be less than that given at Montreal. At Buffalo, in 1886, 39.37020 inches was given as a new determination. In 1893, as the mean of eleven determinations, he gave 39.370155 inches. This may be taken as a final value. It has been subjected to two or more revisions by him since 1893, but with no appreciable change as the result. All physical measurements are necessarily only approximate. There are probably very few of them that have been made with a degree of exactitude superior, or even equal, to this one.

The scientific papers published by Professor Rogers are about seventy in number. The first, which appeared in 1869, was forty-five pages in length, and related to the determination of geographical latitude from observations in the prime vertical. He was at this time about thirty-seven years of age, and still connected with Alfred University, where the facilities for research were very limited. Under his direction in 1865 Alfred Observatory was built and subsequently equipped. His activity as a scientific worker was much stimulated after his connection with the Harvard Observatory became established. During the sixteen years of his residence in Cambridge he published forty scientific papers, most of which related to practical astronomy, such as the determination of star places, the calculation of ephemerides, the study of the errors of instruments, the construction of star catalogues from all known data, etc. Included in such work as this the study of the microscope as an instrument of precision was naturally developed, and the methods of securing accurate rulings for micrometers became a subject for the application of industry. This led Professor Rogers into the study of physical standards of length, and the construction of ruling machines, regarding which he made himself a generally recognized authority. The articles on 'Measuring Machines' and 'Ruling Machines' in the new edition of Johnson's Cyclopedia were written by him.

In all accurate measurements of length the recognition of the temperature at which they are made is a matter of prime importance, since a slight variation in temperature produces a measurable change of length. The recognition of this fact caused Professor Rogers to enter into an extended study of the limits of precision in thermometry, of radiation, and of coefficients of expansion. This continued to be his chief study during the closing years of his life.

Nevertheless, he kept numerous data from his work at Harvard, and published a number of astronomical papers after his removal to Colby University. His special interest, however, had been gradually transferred to the domain of physics. In the construction of micrometers he early experienced trouble on account of the scarcity of suitable spider webs, and this caused him to undertake the etching of fine lines on glass. So successful was he in this that a large number of his plates were secured by the representatives of the national government, and sent out for use by the observers on the occasion of the transit of Venus. During his study of standards of length he visited Europe, obtained authorized copies of the English and French standards, and brought these home with him. They were then used by him as the bases of comparison for bars which he constructed and ruled, and these are now the chief standards in a number of the most important laboratories in America.

Immediately after his removal to Colby University Professor Rogers undertook the study of thirty mercurial thermometers of the U. S. Signal Service pattern, and by comparison with these he secured a standard for the measurement of very low temperatures. It was about this time that Michelson and Morley developed the interferential comparator, and began their investigation regarding the use of the wave-length of sodium as a standard of length. Professor Rogers had already done much work with comparators, and he soon became associated with Professor Morley in the application of optical methods to the determination of minute changes of length. After proper adjustment of apparatus the measurement of almost infinitesimal expansion or contraction becomes possible by merely counting the number of interference fringes of monochromatic light which pass across the field of view in a given period of time. In this way Professor Rogers determined the coefficient of linear expansion of Jessop steel with a degree of precision never before attained. His work in this connection was presented at the Springfield meeting of the Scientific Association in 1895.

In his address last summer at the laying of the corner-stone of the new physical laboratory of Alfred University, Professor Rogers gave a summary of the kind of work which he proposed to undertake personally and with the cooperation of his more advanced students. Prominent among the subjects had in view were the study of the law of expansion of metals under changes of temperature, the standardization of measures of length, the separate measurement of the effects of hot air and of the heat conveyed by radiation, the energy of heat radiations as determined with the interferometer, the development of the construction of precision screws, the practical development of methods of precision in work-shop operation, the investigation of the relative cost and efficiency of small sources of power, of the economy of various methods of heating, and of methods for generation of X-rays. This is an excellent summary of the work to which he had been devoting his energies for some years past.

In acknowledgment of his scientific work Professor Rogers was elected, in 1873, to membership in the American Academy of Arts and Sciences at Boston. In 1880 he received the honorary degree of A.M. from Yale, and during the following year he was made an Honorary Fellow of the Royal Microscopical Society. In 1886 he received the honorary degree of Ph.D. from Alfred University, on the occasion of the semi-centennial of this institution, and in 1892 Brown University conferred the degree of LL.D. In 1895 he was elected to membership in the National Academy of Sciences. In addition to these recognitions of merit he was made Vice-President of the American Mi-

croscopical Society in 1884 and President in 1887; Vice-President for Section A of the Scientific Association in 1882 and 1883, and Vice-President of Section B in 1894. The subject of his vice-presidential address in 1883 was 'The German Survey of the Northern Heavens;' in 1894 it was 'Obscure Heat as an Agent in producing Expansion of Metals under Air Contact.'

Personally Professor Rogers was one of the most unassuming of men, always kindly and considerate in his dealings with others, yet honest and outspoken. With apparently no conception of the meaning of fatigue, he was ever ready to devote hundreds of hours, if need be, to the solution of any problem that he deemed of scientific importance. His time and labor were given freely, with no expectation of reward beyond that which springs from the consciousness of success. He leaves many friends and no enemies, and to the cause of pure science his death is a sad loss.

W. LE C. S.

SIXTH ANNUAL MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION.

THE American Psychological Association held its sixth annual meeting at Cornell University on December 28, 29 and 30, 1897.

For some years the number of papers offered at the meetings has been so great as to crowd the program to a point of serious inconvenience, and as a consequence the experiment was tried this year of holding simultaneous sectional meetings for the reading and discussion of technical papers, a plan which was apparently successful and will probably be followed in the future.

As might be expected from the traditions of the Association, experimental psychology predominated in the number of papers offered, but both general psychology and philosophy were well represented. Two formal discussions were held, one on 'Physical and Mental Tests,' on the 28th, and one on 'Invention,' on the 29th. The President of the Association, Professor J. Mark Baldwin, presided at the meetings.

The opening session was given up to experimental papers, the first being by Dr. J. P. Hylan on 'Fluctuation of Attention.' The speaker presented experimental results and offered the theory that each object of attention innervates certain nervous elements in the cortex, distinct to a considerable degree from those innervated by other objects, and that the comparative exhaustion of one set of elements causes another set to function and the direction of the attention to change or fluctuate in accordance with this change of function.

Dr. Charles H. Judd read a paper on 'The Visual Perception of Depth,' which aimed to show that there is no direct perception of depth by means of the sensations of a single retina unaided by sensations of movement or by binocular factors. The argument was supported by a demonstration of certain visual illusions.

Professor J. McK. Cattell described experiments showing that the time of discrimination increases as the difference in the intensity of two sensations is decreased, and spoke of the applieation of this principle as a method in psycho-physics. Professor Cattell also described a method for studying muscular fatigue in its relations to mental conditions and exhibited a new instrument for fatigue experiments in which a spring dynamometer is substituted for the lifted weights of Mosso. Results thus obtained were shown which do not altogether confirm those of Mosso.

Dr. E. W. Scripture presented a brief summary of recent investigation at the Yale Psychological Laboratory, the publication of which will follow in the 'Studies' from that institution.

Mr. Albert H. Abbott spoke on 'Color Saturation,' reporting results reached by